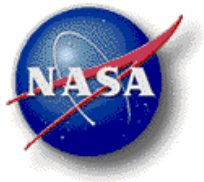


# **Statement of Work (SOW) for the Procurement of Cryogenic Transfer Lines (Replace) at Building 32 (B32)**

Engineering Directorate  
Crew and Thermal Systems Division

January 20, 2011



National Aeronautics and Space Administration  
Lyndon B. Johnson Space Center  
Houston, Texas 77058

**Statement of Work**

**Procurement  
of  
Cryogenic Helium Transfer Lines  
(Replacement) at B32**

**Rev: Rev A  
Date: April 25, 2011**

**Prepared/Approved By:**

**J. Homan STB Senior Engineer                      25 April 2011**

**Approved By:**

**M. Montz Deputy Branch Chief, STB                      25 April 2011**

**CHANGE LOG**

Listed below is the current revision level for this document.

<b>REVISION LEVEL</b>	<b>REVISION DESCRIPTION</b>	<b>DATE</b>
Basic	Original Issue	20 January 2011
Revision A	Sec 3.0 added ASTM E499	25 April 2011
	Sec 5.0 added PFR and project completion	
	Sec 7.1.1 added approval for long lead items	

Sec 7.1.3 added thermal and RV calculations  
Sec 7.5.5 added details of TRR.

## **1.0 Introduction**

NASA Johnson Space Center (JSC) has a requirement for the procurement of hardware and services for the replacement of the original Chamber A helium distribution system. The Crew & Thermal Systems Division (EC), specifically the Systems Test Branch (EC4), is responsible for operating and maintaining Chamber A. The original helium distribution system was installed in support of the Apollo program and over the years the vacuum jacketed line has degraded with small leaks resulting in increased heat loads to the system. The purpose of this procurement is to replace the vacuum jacketed line to operate within acceptable vacuum levels and heat losses and to eliminate the continuous active pumping.

## **2.0 Acronyms**

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ARO	After Receipt of Order
B32	Building 32
CAD	Computer Aided Drafting/Design
COTR	Contract Officer Technical Representative
CTSD	Crew & Thermal Systems Division
GHe	Gaseous Helium
GN2	Gaseous Nitrogen
IAW	In Accordance With
JPR	JSC Procedural Requirement
JSC	Johnson Space Center, Houston, Texas
LN2	Liquid Nitrogen
MAWP	Maximum Allowable Working Pressure
NASA	National Aeronautics and Space Administration
NDE	Non Destructive Examination
PDI	Pre Delivery Inspection
PFR	Pre Fabrication Review
PO	Purchase Order
PPR	Project Planning Review
P&ID	Process/Piping and Instrumentation Diagram
PSMO	JSC Pressure Systems Manager's Office
SOW	Statement of Work
STB	Systems Test Branch
WPS	Welding Procedure Specifications
WPQ	Welder Performance Qualification
WPQR	Welding Procedure Qualification Record

## **3.0 Applicable Documents**

The following documents are applicable to this Statement of Work. The revision to be used shall be the one in effect at the date of the contract award. If any apparent conflict between the requirements put forth in these reference documents and the specification is found, it shall be brought to the attention of the Buyer for resolution.

Attachment	Document Number	Industry Codes & Standards	Revision
-	ASME Section V	B&PV Code, Nondestructive Examination	-
Attachment	Document Number	Technical Specifications & Drawings	Revision
-	ASME Section IX	B&PV Code, Welding & Brazing Qualification	-
-	ASME B31.3	Process Piping	2008
-	ASTM A380	Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.	-
-	ASTM E498	Standard Test Methods for Leaks Using the Mass Spectrometer Leak Detector or Residual Gas Analyzer in the Tracer Probe Mode	-
-	ASTM E499	Standard Test Methods for Leaks Using the Mass Spectrometer Leak Detector in the Detector Probe Mode	-
-	NFPA-70	National Electric Code (NEC)	-
-	29 CFR 1926	Occupational Safety and Health Administration (OSHA) - <i>Safety &amp; Health Regulations for Construction</i>	-
A	CTSD-JWT-0064	Requirements & Specifications for the Repair and Replacement of the Cryogenic Helium Distribution Lines	Basic 1/20/2011
B	CTSD-SH-1301	CTSD Contractor Environmental, Safety & Health Procedure Orientation	Rev D 7/24/2006
C	CTSD-SH-1355	CTSD Restricted Access Personnel Authorization Procedure	Rev C 11/4/2003
-	JPR 1700.1	JSC Safety and Health Handbook <a href="http://jschandbook.jsc.nasa.gov/">http://jschandbook.jsc.nasa.gov/</a>	Rev J April 2008
D	JPR 1710.13	Design, Inspection, and Certification of Pressure Vessels and Pressurized Systems	Rev E 9/29/2009
E	JPR 8550.1	JSC Environmental Compliance Procedural Requirements	Basic 11/28/2004
F	JSC Form 473A	NASA JSC Badge Request Form	9/20/2004
G	NASA-STD-8719.9	NASA Standard for Lifting Devices and Equipment	Baseline 5/09/2002
H	JPR 5322.1	JSC Contamination Control Manual	Rev G

#### 4.0 General Scope

This solicitation is for work to design, fabricate, install, and test replacement piping for the cryogenic distribution system for chamber A's original cryo-pumping panels.

**DESIGN:** The contractor shall develop all spool and installation drawings based on NASA provided P&IDs and contractor provided field measurements. The design features shall meet the requirements set forth in the list of reference documents and in the attached technical specification including flexibility to B31.3.

**FABRICATION:** The contractor shall build the spools in accordance with the list of reference documentation and to the requirements levied in the technical specification.

**INSTALL:** The contractor shall install all new pipe spools, valves, instrumentation, etc. in the field, and make any adjustments required on site.

**TESTING:** The contractor shall test all field installations per the attached technical specification.

#### **4.1 Government Furnished Equipment and Support**

NASA will provide the following support services:

1. Demolition of existing piping: It shall be the contractors responsibility to mark appropriate areas for demolition. NASA will provide technical support in the removal of the major piping and hardware as directed by the seller.
2. Rigging: NASA will provide all rigging support as needed by the seller.
3. Scaffolding: NASA will provide scaffolding support as needed by the seller.
4. Nitrogen Test Gas: NASA will supply nitrogen for pressure testing the final field test as an assembly. The seller shall supply gas for testing at their facility and for component level testing in the field (on-site). The seller shall provide drawings and hardware for the final pressure and leak tests.
5. Equipment: Any equipment removed from the original system may be given to the seller for refurbishment to the government as approved by the COTR.

#### **5.0 Project Schedule**

The following schedule summarizes the delivery requirements of the listed items. All documentation shall be delivered to the COTR and shall cite the contract number and delivery date. The COTR will authorize the Contractor to proceed with the next phase of contract.

ID	ENGINEERING DATA DELIVERABLES	REFERENCE	SECTION	DUE/START	NOTE:
a)	<b>Project Kickoff Meeting at JSC</b>	SOW	7.1	1 wk ARO	COTR to Plan
b)	Quality Management Plan	SOW	7.5.8	At PPR	For approval
c)	Company General Safety & Health Plan	SOW	8.1	At PPR	For approval
d)	Welding Records & Procedures -WPS,WPQR,WPO			At PPR	For approval
e)	<b>Project Planning Review</b>	SOW	7.2	3 wk ARO	COTR to Plan
f)	Hazard Assessment & Safety Action Plan	SOW	8.2	5 wks ARO	For approval
g)	Contractor's Shop specific Cleaning Procedure			5wks ARO	For approval

h)	Contractor's Shop specific Fabrication Plan	SOW	7.1.3.2	5 wks ARO	For approval
i)	Shipping & Material Handling Plan -Preliminary - Final	SOW	7.5.5	5 wks ARO At PFR	For review For approval
ID	ENGINEERING DATA DELIVERABLES	REFERENCE	SECTION	DUE/START	NOTE:
j)	B31.3 Compliance Check-list	SOW	7.2c	5 wks ARO	For approval
k)	B31.3 Calculation Packages	SOW	7.2e	8 wks ARO	For review
l)	<b>Pre-Fabrication Review</b>	SOW	7.1.3	9 wks ARO	COTR to Plan
m)	B31.3 Calculation Executive Summary Reports	SOW	7.2f	11 wks ARO	For approval
n)	<b>Contract Complete</b>			27 wks ARO	

## 6.0 Document Formats

### TEXT DOCUMENT FORMATS:

Text documents are documents—e.g., specifications, procedures, memos, reports—other than drawings and databases which are part of the engineering function. Text documents shall be electronically created and maintained using Microsoft Word or PDF format. An electronic copy and hard copy shall be maintained and delivered.

Three (3) electronic and (3) hard copies of all documents and documentation packages shall be delivered to the COTR.

### DRAWING FORMATS:

All pipe spool and sub assembly drawings delivered to NASA shall be in CAD format. Drawings shall be created so they are fully legible when printed in ANSI D size, if a particular drawing cannot meet this requirement, then the Contractor shall obtain prior approval for that drawing from the COTR.

Fabrication, Construction, and Final As-Built drawings submitted shall be as follows:

1. Hardcopy: One full size (ANSI D) and two reduced size (ANSI B) drawings, black ink on white paper.
2. Electronic: Drawings shall be CAD (.dwg or .dxf). Electronic format shall be delivered in CD or DVD disc format.

All revisions of a drawing(s) shall be indicated on the drawing(s) by clouding and shall specifically be noted in the revision block of that drawing.

Parts lists/bills of material shall be prepared integrally with any drawings where it is required and shall be shown on the first sheet of those drawings.

Fabrication Drawings are those drawings created by the Contractor or other entity that illustrate construction, materials, dimensions, installation, and other pertinent information about that element or item required for fabrication or construction. These drawings usually depict the part or component as an orthographic projection with each view containing the necessary dimensions. They should specify all critical starting and finished requirements. They should also reference any critical company or industry

specifications. In the event of conflicts between the fabrication drawings and other supplied information, the fabrication drawings shall take precedence.

As-Built Drawings (record documents) depict the final installed configuration (whether physical or functional). During construction the Contractor shall maintain a set of as-built drawings, which reflect changes in and deviations from the construction drawings as components are installed in the field. The as-built drawings shall be available for inspection by the Buyer at all times. A final set of as-built drawings shall be submitted to the COTR for approval two (2) weeks after installation completion. Approval of drawings: The deliverable drawings requested in this section will be reviewed in a face to face review with the Contractor. If deficiencies are found the Contractor will be notified and the corrective action required to correct the deficiencies shall be the contractor's burden.

## **7.0 Engineering Data Deliverables**

The following paragraphs specify the information that is required for approval of Engineering Data Deliverables. NASA reserves a turnaround time of up to 10 business days for return of comments and approval to the contractor. The Contractor should include this turnaround time in the schedule where appropriate.

### **7.1 Coordination Meetings**

#### **7.1.1 Project Kickoff Meeting**

A Kickoff Meeting Coordinated and organized by the COTR and the contractor Point of Contact will be arranged. Attendees shall include the project manager and core functional team members. The purpose of the meeting is to describe the project scope, align team members on the project goals, clarify team member responsibilities, specify critical timeline elements and, identify any risks that must be managed. The agenda shall include Introduction of team members, Project scope, Project approach, work, timeline, risks, and any long lead purchase items to approve. Action items shall be published and furnished to all attendees for resolution prior to the PPR.

At this meeting, long lead purchase items may be given approval for order if proper documentation delivered with proposal or at resolution from actions from the meeting.

This meeting will be held at JSC.

#### **7.1.2 Project Planning Review**

The review goals are:

1. To ensure that the Contractor has a common understanding of the SOW and Technical Specification.
2. To review the Contractor's manufacturing processes and credentials (i.e. welding documentation, NDE, calibration of testing equipment), and to assess adherence to the Contractor's quality plan ensuring that the product delivered will meet all applicable procedures, codes, and specifications.
3. To review the plan and schedule. The Project Schedule shall include line items for all pertinent engineering data deliverables outlined in this SOW and Technical Specification, design reviews, raw material procurements, fabrication schedule, hold points (witness points), testing, documentation preparation and shipment dates.

This review shall also be held at NASA JSC.

### **7.1.3 Pre-Fabrication Review**

A Pre-fabrication meeting will be held to:

1. Review the contractor's standard work traveler or work ticket and compare it with the Quality Plan.
2. Review the B31.3 analysis results and corrective actions.
3. Review thermal calculations of estimated heat loss from contractors design.
4. Review of relief valve calculations.
5. Review the Contractor's improvements for the PPR and/or deficiencies shall be noted and corrected by the Contractor prior to fabrication.
6. Review fabrication drawings scheduled for production.
7. Obtain COTR's written Authorization to Purchase Materials and Start Fabrication. This will be dependent upon their approval of the data deliverables requested at this review.

Sections 7.1.3.1 and 7.1.3.2 outline the required Engineering Deliverables for this review.

This review shall be performed at the Contractors facility.

#### **7.1.3.1 Subcontractor Utilization Plan**

The Contractor shall provide the following at the PFR:

1. The name and contact information for all subcontractors that will be utilized during all phases of the Design, Fabrication, Installation and Testing.
2. The Contractor shall describe how each subcontractor will be utilized.
3. A synopsis of each subcontractor's ability to meet the SOW technical requirements and capacity with similar scope of work outlined in this Statement of Work.

#### **7.1.3.2 Fabrication Plan (Shop and Field)**

The Contractor shall submit a fabrication plan that includes any subcontractors and their role and responsibilities. The plan shall address the fabrication approach to be used by the Contractors, and define the raw material controls, fabrication assembly flow path, quality check, cleaning, leak checking, and proof pressure processes, as well as preparations for shipment.

The plan may be a single document or make use of existing "travelers" or other suitable planning and work control documentation. It shall address:

1. A representative pipe spool fabrication record or traveler used to archive the step by step fabrication process.
2. Identification of parts and subassemblies showing integrated flow into end item(s).
3. Identification of critical manufacturing operations as well as inspection and test checkpoints.
4. The contractor's plan for performing any tests required by ASME for the qualification of:
  - a. Welding Procedure Specifications (WPS).
  - b. Welding Procedure Qualification Record (PQR).
  - c. Welder/Welding Operator Performance Qualification Record (WPQ).
5. Field testing Process.



### **7.1.3.3 Site Mobilization Plan**

The purpose of this plan is to ensure contractor compliance with the required on-site safety regulations, training needs, security process, and familiarization with the facility and personnel. Authorization to Mobilize will be approved after all pertinent engineering deliverables in SOW have been approved. Factors that will influence the content of this plan include the following:

1. NASA will have an onsite Facility Manager who is responsible for all contractor work activities while on-site at NASA/JSC. The NASA Facility Manager and the COTR shall approve this milestone phase.
2. The Contractor shall submit a detailed logistical strategy that addresses staging area required, office space required, pipe spool storage requirements, equipment and consumable storage requirements.
- During installation and field work, a responsible and knowledgeable Contractor representative shall attend the existing daily construction coordination meeting. In addition, the contractor shall provide the NASA Facility Manager and/or COTR with weekly progress reports, and the next weeks task projections and milestones. A one sheet summary shall be submitted each week to fulfill this action.
3. Hours of Work: All job site work at NASA JSC required in the SOW shall be performed Monday through Friday between the hours of 7 am and 5:00 pm. All federal holidays are observed. The Contractor shall obtain approval for any deviations from the regular working hours or days by submitting a written request to the COTR at least 3 working days in advance.
4. Cleanup and Disposal of Materials: At reasonable intervals during the progress of field work and at contract completion, the Contractor shall clean up the worksite and shall dispose of waste in Government supplied containers per SOW section 9.0.

### **7.1.3.4 Installation Plan**

The Contractor shall also provide an Installation Plan that describes how items are to be moved into their final positions and the field services and equipment that will be required to perform these tasks. This shall include any subcontractors that will be performing work on site at NASA/JSC and any coordination for Government provided services (i.e. rigging, scaffolding, and demolition).

- Coordination of multiple trades and outside Contractors performing work concurrently is the responsibility of the on-site NASA Facility Manager. The contractor shall submit an Installation schedule for approval by the COTR. The plan and the schedule shall highlight when and in which areas work is to be performed. This will help our Facility Manager to prevent Contractor congestion in a given area.

## **7.2 B31.3 Analysis, Review & Documentation**

1. Piping Flexibility Basic Requirements: Piping systems shall be designed to have sufficient flexibility to prevent thermal expansion or contraction movements of the piping supports and terminals from causing (a) failure of piping (process and vacuum) or supports from overstresses or fatigue (b) leakage of joints (c) detrimental stresses or distortion in piping and valves or in connected equipment, that result from excessive thrusts and moments induced in the piping.

ASME B31.3 Process piping version 2004 or later shall be the basis for design, requirements and analysis.

2. Piping Stress analysis is a term applied to calculations, which address the static and dynamic loading resulting from the effects of gravity, temperature changes, internal and external pressures, changes in fluid flow rate and seismic activity. B31.3 Process Piping Codes and the International Building Code establish the minimum requirements of stress piping analysis and pipe support design. Each fluid phase has their unique modes of operating conditions as described in the technical specifications. The flexibility and the stress analysis shall take these modes of operation/parameters into account as a basis for the Flexibility and Stress analysis.
3. Code Compliance Checklist: The Contractor shall provide a complete fabrication and testing “Code Compliance Checklist” that outlines the measures that will be used to meet the process piping B31.3 requirements. This checklist shall convey the necessary design, fabrication and testing steps for fabrication of spool pieces. This checklist shall be submitted and approved by the COTR and/or COTR Quality representative prior to the Pre-Fabrication Review
4. When computer analyses, including finite element analyses are used, deliverable information shall include a description of the analyses with applicable geometry, dimensions, loads, other boundary conditions, annotated input data files, plots of model geometry, and results. This information shall be sufficient to recreate the analysis if necessary. Computer programs, data inputs, and data output utilized in these analyses must be documented and available to NASA upon request. The vendor shall identify the software utilized for the B31.3 analysis to NASA prior to starting the analysis. The software utilized shall comply with ASME B31.3 Process piping version 2008 or later.
5. B31.3 Piping Calculation Packages: The Contractor shall prepare an analysis report for each spool piece. The Contractor shall take into consideration the complete piping assembly and the interfaces with each connection to vessels and identify where adjustments to the process or vacuum jacket piping are required. In addition, pipe supports identified in NASA provided installation drawings must be verified and adjusted if required.
6. B31.3 Calculation Executive Summary Reports: Analysis reports shall be identified either by the unique pipe spool numbers to which they apply or as in general deemed to be inclusive of all piping associated with this SOW. An executive summary report and a “certificate of compliance” stating that all piping is designed, fabricated and tested in accordance with ASME B31.3 shall be submitted.

### **7.3 Vacuum Bakeout & Retention Test Procedure**

The bakeout procedure shall address the field procedures for performing the task of evacuating the vacuum annulus in preparation for a final vacuum acceptance test. The following shall be addressed in the procedure: cleanliness during the process, equipment required, temperatures of nitrogen to be used, and any other consumables that are required to perform the task, the source of these consumables, the acceptance criteria, safety requirements and requirements from NASA.

The Vacuum Retention Test Procedure shall address: the minimum test period, acceptance criteria and the data recording method. The vacuum test procedures for the shop and field shall be submitted for approval at the PFR.

### **7.4 System Piping Dossier**

- System Piping Executive Summary “B31.3 Certificate of Compliance”
- Table of Contents and Index
- Individual Pipe Spool Fabrication Drawing(s)
- Individual Pipe Spool B31.3 Analysis Report & interpreting results.

- Individual Pipe Spool Proof Pressure certificate
- Individual Pipe Spool Helium Vacuum Leak Check certificate
- A copy of contractor's completed and signed off Individual Pipe Spool Fabrication Traveler.
- As-built drawings, spool and installation.
- Shop System Pressure Test certificate
- Shop System Vacuum Helium Leak Check certificate
- Shop Vacuum Retention Test Results.
- Field (JSC) System Pressure Test certificate
- Field (JSC) System Vacuum Helium Leak Check certificate
- Field (JSC) Vacuum Retention Test Results.

This compilation of documents requested in this section will be reviewed in a face to face project closeout review with the contractor, NASA's field quality assurance, COTR and Facility Manager. If deficiencies are found the contractor will be notified and corrective action to fulfill the completeness of the package shall be the contractor's burden.

## **7.5 Engineering and Design Control**

The Contractor's Quality Assurance Program in addition to NASA's Quality Assurance Program shall provide for a system of controls over engineering and design activities. The Contractor shall implement procedures that provide for review and approval of specifications, drawings and other significant engineering documents, as well as changes thereto, prior to issuance for use. Such reviews shall be conducted to verify completeness, correctness and adequacy with respect to contract requirements and intended application.

### **7.5.1 Inspection/Surveillance/Audit**

The Contractor shall afford the buyer's representative(s) all reasonable access to the Contractor's facilities and those of the Contractor's suppliers for the purpose of inspection, surveillance and audit in order that the buyer's representative(s) may assure that items are being furnished in accordance with contract requirements. The entire Contractor's records and documentation necessary for this function shall be made available for review by the buyer's representative(s).

### **7.5.2 Witness Points**

The Buyer reserves the right to designate selected raw material shipments, manufacturing and/or testing "witness points" or hold points. The Contractors shall provide the COTR with ten (10) working days notice in advance of the of the readiness of these or the fabricators "witness points"

### **7.5.3 Nondestructive Evaluation**

All nondestructive examinations must be performed by qualified personnel in accordance with procedures that comply with the requirements of ASME Section V.

The JSC PSMO through the COTR reserves the right to review and evaluate the Nondestructive Evaluation (NDE) results for acceptance.

NDE documentation such as, but not limited to, the written practice for qualification and certification of NDE personnel, personnel qualifications and certifications, personnel vision acuity, inspection procedures, material certifications and equipment calibrations shall be provided to the COTR upon request. Electronic delivery of documents to the COTR is preferred.

The Contractor is responsible for all NDE on this contract to meet ASME B31.3.

#### **7.5.4 Cleaning**

The Seller shall supply the company cleaning procedures for review at the Pre-Fabrication Review. These shall provide information on the cleaning of the process piping, vacuum jacketed piping, handling of MLI, and drying and baking of the vacuum jacketed line.

#### **7.5.5 Pressure Test**

Provide evidence of pressure testing per ASME requirements. Each pipe spool shall have a durable metal tag stating proof pressure rating. A proof pressure certificate shall be traced to each respective pipe spool. NASA or designated witness reserves the right to witness any proof pressure test. The Contractor shall inform the COTR of proof pressure schedules.

Where pressure tests are performed in the field (JSC), evidence shall be provided to NASA thru the Quality Assurance inspection and acceptance process.

The final system level pneumostat test shall be prefaced with a Test Readiness Review (TRR) as required by NASA. This review ensures the completeness of the system as a pressure system, reviews the test setup, and reviews the proper safety protocols for the test. The Contractor shall prepare a small power point presentation with the COTR for this review. This review will be chaired by NASA (EC) management, NASA safety, and the NASA PSMO.

#### **7.5.6 Shipment**

The Contractor shall provide proper protection from shipping loads and the environmental damage during transportation, hauling and storage.

The Contractor shall assume all responsibilities, risks, labor, transportation and other costs for shipment of assemblies to the Buyer's site. The Contractor shall arrange for shipment routes considering weights, clearances, permits statutes and where necessary arrange for escorts and the timing of shipments.

The Contractor shall develop a preliminary shipping and handling plan document for all equipment and present 5 weeks ARO for review. The following shall be detailed in the requested document.

Provisions for maintaining component(s) integrity and cleanliness during site-to-site transportation.

Provide all fixtures required and any lifting points required on equipment to safely install into the facility.

The Contractor shall develop a rigging and material handling plan required to install all piping. This is to aid NASA's Facility Manager in forecasting and managing construction activities with this and concurrent projects.

The Contractor shall develop a mature shipping and handling plan expanding and further detailing as outlined in section 9.7c. All information is necessary for NASA to coordinate ongoing construction

activities at final jobsite. The final shipping and handling plan document must be delivered at the pre-fabrication review for NASA review and approval.

The Contractor shall notify the COTR the ship dates of the components and pipe spools. A Pre Delivery Inspection (PDI) may be requested by the COTR and may be waived by the COTR. The PDI shall be performed 2 weeks prior to actual shipment of the components. The COTR and or NASA Quality Assurance reserve the right to inspect the item(s) prior to shipment. This will ensure that the Contractor shipping and configuration plan developed in section 9.7d have been performed prior to shipment.

#### **7.5.7 Labels and Colors**

Piping shall be labeled to match the rest of the cryogenic lines (large blue background with white and/or black lettering and arrows). A sample label shall be presented to the Facility Manager prior to installing on the piping. Labels shall be installed at locations to allow ease of visual tracing with all apparent obstacles. All painted or colored parts must be either gray or blue as approved by the Facility Manager.

#### **7.5.8 Non-Conforming Materials or Items**

When an article or material is found to depart from the drawing, specifications, tests or other contract requirements, and cannot be readily resolved by rework of the item or by scrapping it (at the Contractor's expense), the Contract Administrator and the Contract Technical Monitor shall be contacted for written approval of alternative disposition.

#### **7.5.9 Suspect/Counterfeit Parts**

Unless specified otherwise, the supplies and components to be delivered under this contract shall be new (not used, reconditioned or repaired) and shall not be of such an age or so deteriorated as to impair their usefulness or safety.

Piping, valves and flanges bearing labels that falsely indicate that the items meet recognized ASME or ASTM consensus standards are considered suspect/counterfeit parts.

If suspect/counterfeit parts are furnished under this contract, such parts shall be impounded by NASA or removed by Seller as directed NASA. Seller shall promptly replace such parts with those acceptable to NASA, and Seller shall be liable for all costs relating to impoundment, removal and replacement.

#### **7.5.10 Quality Management Plan**

A document describing an organization's quality system. This document identifies the organizational structure, policy and procedures, functional responsibilities of management and staff, lines of authority, and its processes for planning, implementing, documenting, and assessing all activities conducted under the organization's quality system. This document shall be submitted to the COTR at the PPR for approval.

### **8.0 Safety & Health**

#### **8.1 Contractor Safety & Health Plan**

The Contractor shall submit a current, comprehensive, written General Safety and Health Plan describing the Contractor's overall Safety and Health Program. This document shall include but not be limited to the following information.

- Purpose and Scope of the Safety and Health Program
- Responsibilities of Managers, Supervisors, Employees in the Safety and Environmental Health Program
- Process for Hazard Assessment
- Process for hazard reporting and investigation of Close Calls/Near Misses and mishaps within the company structure
- Safety and Environmental Health training programs
- General Construction Safety
- Handling of hazardous chemicals / materials
- Lockout/Tag out program
- Fall Protection program
- Welding and Cutting program
- Confined Space Entry program
- Lifting, rigging and material handling program
- Electrical Safety
- Environmental Protection
- Scaffold safety and certification
- Safety and Health Requirements for Contractors
- Experience Rating for the company for the past 3 years

A review of the safety program will result in approval if the content sufficiently encompasses safety needs associated with specified tasks. Review of past injury performance will be compared with industry average for the Contractor's Standard Industrial Classification (SIC). Rates at or below industry average will result in approval. Rates above average may result in exclusion from selection.

## **8.2 Hazard Assessment and Safety Action Plan**

The Hazard Assessment & Safety Action Plan (HASAP) is a comprehensive Contract Specific Safety and Health Plan tailored to the activities on this contract as NASA-JSC

The primary goal of the HASAP is to identify hazards associated with project work activities and to identify controls to mitigate the risk associated with those hazards. In addition, the HASAP defines the Health and Environmental Safety program elements required to accomplish field activities in a safe and environmentally sound manner and establishes the strategies and methods for their implementation.

## **8.3 Safety Training**

1. The Contractor's employees must have proper certifications in the following safety applications:
  - a. Elevated work / fall protection.
  - b. Personnel Protective Equipment (PPE) associated with the processes to fulfill the work defined in this SOW.
  - c. Scaffold User.
  - d. Confined Space Entry.
  - e. Other safety training, as required by the task.
2. The Contractor shall submit to the COTR the safety certification records of field personnel prior to start of work onsite NASA. If Contractor personnel do not have the required certifications, training may be obtained at the Houston Area Safety Council or other Safety Council that is listed as a member in good standing with the "Association of Reciprocal Safety Councils, Inc. (ARSCI)"

3. Contractor personnel shall maintain evidence that the required training has been completed and is current prior to working onsite NASA-JSC.

#### **8.4 Fire Watch**

1. During all “hot work” operations, the Contractor shall post a fire watch to recognize fire hazards, notify appropriate responsible persons in the event of an emergency, start an orderly emergency evacuation when appropriate, and safely use a small portable fire extinguisher.
2. The Contractor shall maintain a fire watch at the work site for at least 30 minutes after completion of welding or cutting operations to detect and extinguish possible smoldering fires per JPR-1700.1, JSC Safety & Health Handbook.
3. A minimum of one fire watch is required for hot work operation occurring within an unobstructed 35 ft radius view.

#### **8.5 Site Safety**

1. At the time of work performance or during any other on-site visits, it is expected that every Contractor shall adhere to the established safety rules for this location as stipulated in CTSD-SH-1301, CTSD Contractor Environmental, Safety, and Health Procedures Orientation Handbook.
2. The Contractor shall supply MSDS sheets for all materials to be used on site. These sheets shall be provided to the COTR no less than 5 working days prior to commencement of work.
3. It is expected that every Contractor performing tasks inside JSC facilities shall comply with applicable provisions of all Federal, State, Local laws and Ordinances, and all lawful orders, rules and regulations. Differences between the JSC standard and other standards shall be resolved in favor of the more stringent standard.
4. The Contractor will be made aware that responsibility for following safety rules is not an option and that violations may result in termination of contracted services.

#### **8.6 JSC Access Badging**

1. For access to work onsite at NASA Johnson Space Center, all Contractor personnel must submit a security badge request. The Contractor shall fill out part 2 of JSC Form 473A and submit proof of U.S. citizenship to NASA Security. Proofs of citizenship include a copy of passport, US birth certificate, or naturalization papers. Note: Drivers license is not considered proof of citizenship.
2. For access to work onsite in JSC Building 32, a 30 minute safety CTSD orientation training (ref. CTSD-SH-1301) is required for all personnel prior to commencement of work per CTSD-SH-1355, CTSD Restricted Access Personnel Authorization Procedure (attachment C).

#### **9.0 Environmental Safety**

The Contractor and all subcontractors shall be required to follow the JSC Environmental Compliance Procedural Requirements, JPR 8550.1 while performing work at NASA’s Johnsons Space Center (attachment E).

#### **10.0 NASA Point of Contact**

The primary NASA point of contact for this contract will be the COTR. All field work on site will be coordinated with the Facility Manager (FM). The COTR and FM are NASA civil servants. On-site support contractors may be given authority to act on behalf with written permission from the COTR.

Contract Officer Technical Representative: Jonathan L. Homan

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